AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of claims:

1. (Previously presented) A method for modulation, comprising the steps of:

regularly subjecting an input digital signal to first modulation and second modulation to convert the input digital signal into a pair of a baseband I signal and a baseband Q signal, the first modulation and the second modulation being different from each other; and

outputting the pair of the baseband I signal and the baseband Q signal;

wherein the first modulation is at least 8-signal-point modulation, and the second modulation is phase shift keying;

wherein the phase shift keying provides periodically-spaced symbols which represent corresponding portions of the input digital signal in terms of differences between phases of the periodically-spaced symbols; and

wherein the at least 8-signal-point modulation assigns logic states of the input digital signal to respective signal points for a first symbol in response to a signal point used by a second symbol of the phase shift keying which precedes the first symbol.

2. Cancelled

3. (Previously presented) A method as recited in claim 1, wherein the phase shift keying is quadrature phase shift keying.

4. (Previously presented) A method as recited in claim 3, wherein the quadrature phase shift keying provides signal points on an I axis and a Q axis in an I-Q plane.

5. (Previously presented) A method as recited in claim 1, wherein the at least 8-signal-point modulation is at least 8 quadrature amplitude modulation.

6. (Original) A method as recited in claim 4, wherein the at least 8-signal-point modulation is at least 8 quadrature amplitude modulation.

7. (Previously presented) A method as recited in claim 5, wherein at least 8 quadrature amplitude modulation is 16 quadrature amplitude modulation.

8. (Original) A method as recited in claim 6, wherein the at least 8 quadrature amplitude modulation is 16 quadrature amplitude modulation.

9. (Original) A method as recited in claim 5, wherein the at least 8 quadrature amplitude modulation provides signal points which result from rotation of signal points of at least 8-value normal quadrature amplitude modulation through an angle of $\pi/4$ radian about an origin in an I-Q plane.

10. (Original) A method as recited in claim 6, wherein the at least 8 quadrature amplitude modulation provides signal points which result from rotation of signal points of at least 8-value normal quadrature amplitude modulation through an angle of $\pi/4$ radian about an origin in an I-Q plane.

11. (Original) A method as recited in claim 7, wherein the 16 quadrature amplitude modulation provides signal points which result from rotation of signal points of 16-value normal quadrature amplitude modulation through an angle of $\pi/4$ radian about an origin in an I-Q plane.

12. (Original) A method as recited in claim 8, wherein the 16 quadrature amplitude modulation provides signal points which result from rotation of signal points of 16-value normal quadrature amplitude modulation through an angle of $\pi/4$ radian about an origin in an I-Q plane.

13. (Previously presented) A method as recited in claim 1, wherein a maximum of amplitudes corresponding to signal points of the at least 8-signal-point modulation in an I-Q plane is equal to an amplitude of a signal point of the phase shift keying in the I-Q plane.

Claims 14-32 (cancelled).

33. (Previously presented) A transmission apparatus comprising:

first means for periodically and alternately subjecting an input digital signal to first modulation and second modulation to convert the input digital signal into a pair of a baseband I signal and a baseband Q signal, the first modulation and the second modulation being different from each other, the first modulation being at least 8-signal-point modulation, the second modulation being phase shift keying;

second means for outputting the pair of the baseband I signal and the baseband Q signal;

wherein the phase shift keying provides periodically-spaced symbols which represent corresponding portions of the input digital signal in terms of differences between phases of the periodically-spaced symbols;

wherein the at least 8-signal-point modulation assigns logic states of the input digital signal to respective signal points for a first symbol in response to a signal point used by a second symbol of the shift keying which precedes the first symbol; and

wherein said first symbol is demodulated by using said second symbol which is not a known prescribed pattern but a part of information transmitted by said transmission apparatus.

Claims 34-36 (cancelled).

37. (Previously presented) A transmission apparatus as recited in claim 33, wherein the symbols provided by the phase shift keying are used as a pilot symbol for estimating at least one of (1) a transmission path distortion and (2) a frequency offset.

38. (Currently amended) A modulation method for modulating an input digital signal into a multi-value symbol stream, the modulation method comprising:

generating a first multi-value modulation signal having first multi-value symbols from the input digital signal with a first modulator;

generating a second modulation signal containing second multi-value symbols from a part of information of said input digital signal by using a second modulator, ~~at least one of~~ (1) a channel distortion and (2) a frequency offset of said first multi-value modulation signal being estimated by using only said second modulation signal to demodulate said first multi-value modulation signal in a receiver; and

inserting said second multi-value symbols into said first multi-value symbols such that the resultant multi-value symbols constitute said multi-value symbol stream.

39. (Previously presented) A modulation method as recited in claim 38, (1) said channel distortion and (2) said frequency offset are estimated from each of said second multi-value symbols.

40. (Previously presented) A modulation method as recited in claim 38, wherein differential encoding is done between symbols of the second modulation signal.

41. Cancelled

42. (Previously presented) A modulation method as recited in claim 38, wherein the second modulation signal is obtained by phase shift keying (PSK) modulation.

43. (Previously presented) A modulation method as recited in claim 42, wherein the second modulation signal is obtained by binary phase shift keying (BPSK) modulation.

44. (Previously presented) A modulation method as recited in claim 42, wherein the second modulation signal is obtained by quadrature phase shift keying (QPSK) modulation.

45. Cancelled

46. (Previously presented) A modulation method as recited in claim 38, wherein the first modulation signal is obtained by at least 8-value modulation.

47. (Previously presented) A modulation method as recited in claim 46, wherein the first modulation signal is at least an 8-value quadrature amplitude modulation (QAM).

48. (Previously presented) A modulation method as recited in claim 38, wherein the first modulation signal is obtained by 16QAM and the second modulation signal is obtained by PSK modulation, and a maximum signal point amplitude of the second modulation system is equal to 0.9 to 1.5 times a maximum signal point amplitude of the first modulation signal.

49. (Currently amended) A transmission apparatus comprising a first multi-value modulation system for subjecting an input digital signal to first modulation and outputting a first quadrature baseband signal;

a second modulation system for subjecting the input digital signal to a second modulation and outputting a second quadrature baseband signal, a frequency offset and a channel distortion of said first quadrature baseband signal being estimated by using only said second quadrature baseband signal to demodulate said first quadrature baseband signal in a receiver and

wherein said second quadrature baseband signal is regularly inserted into the first quadrature baseband signal.

50. Cancelled

51. (Previously presented) A transmission apparatus as recited in claim 49, wherein differential encoding is done between symbols of the second modulation system.

52. Cancelled

53. (Previously presented) A transmission apparatus as recited in one of claims 49 and 51, wherein the second modulation system is phase shift keying (PSK) modulation.

54. (Previously presented) A transmission apparatus as recited in claim 53, wherein the second modulation system is binary phase shift keying (BPSK) modulation.

55. (Previously presented) A transmission apparatus as recited in claim 53, wherein the second modulation system is quadrature phase shift keying (QPSK) modulation.

56. Cancelled

57. (Previously presented) A transmission apparatus as recited in one of claims 49 and 51, wherein the first modulation system is at least 8-value modulation.

58. (Previously presented) A transmission apparatus as recited in claim 57, wherein the first modulation system is at least 8-value quadrature amplitude modulation (QAM).

59. (Previously presented) A transmission apparatus as recited in one of claims 49 and 51, wherein the first modulation system is 16QAM and the second modulation system is PSK modulation, and a maximum signal point amplitude of the second modulation system is equal to 0.9 to 1.5 times a maximum signal point amplitude of the first modulation system.

Claims 60-73 (cancelled)